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ABSTRACT

The ways in which experience and academic training influence the types of questions therapists ask of their clients were studied. Psychologists and psychology students of varying degrees of expertise (n=138) were provided an artificial intelligence program that simulated a date rape client's responses to typed questions and were asked to conduct a "clinical interview" by typing in their questions and other responses. Clinical experience was found to be unrelated to participants' levels of confidence, perceived expertise, or efficiency in generating or analyzing questions, but both experience and level of training did affect the type of responses and questions of participants. The significance of these findings is discussed. It is noted that the medium of the computer may have changed the ways the participating psychologists handled the case presentation. (Contains 2 tables and 60 references.) (Author/SLD)

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Expertise in Psychological Inquiry: A computerized Assessment

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Running Head: Expertise in Psychological Inquiry

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Abstract

Psychologists and psychology students (n = 138) were provided an artificial-intelligence program that simulated a date rape client's responses to typed questions and asked to conduct a "clinical interview" by typing in their questions and other responses. Clinical experience was found to be unrelated to participants' levels of confidence, perceived expertise, or efficiency in generating or analyzing questions. But both experience and level of training did affect the type of responses and questions of participants. The significance of these findings is discussed.

Expertise in Psychological Inquiry

During the past two decades, psychologists have been responsible for a considerable and growing literature on the nature of expertise and how it develops (Bloom, 1985; Cooke, 1992; Ericsson & Crutcher, 1990; Ericsson & Charness 1994; Ericsson, Krampe, & Tesch-Römer, 1993; Hayes, 1981; Patel & Groen, 1988). Most such studies have focused on fields outside of psychology. They have addressed expertise in populations such as college students (Radhakrishnan, Arrow, & Sniezek, 1996), factory workers (Garmer, Dahlman, & Sperling, 1995), entrepreneurs (Mitchell & Chesteen, 1995), and classroom teachers (Pugach, & Johnson, 1995). The domains have included such areas as playing chess, planning military strategy, reading x-rays, and programming computers.

The purpose of this paper was to add to the still-small literature concerning expertise in the domain of professional psychology. Specifically, this study explores the ways experience and academic training influence the types of questions therapists ask of their clients. Though a number of other factors may prove more important to therapeutic outcomes, therapists' modes of inquiry were examined in this study because this task appears to be foundational to other therapeutic activities.

The literature on critical judgment in psychology and other fields emphasizes the importance of pattern heuristics, forward reasoning, and procedural knowledge. In most fields, the literature demonstrates a connection between these components with experience and training. In psychology, however, the connection appears tenuous at best.

the literature demonstrates a connection between these components with experience and training. In psychology, however, the connection appears tenuous at best.

Psychologists interested in the nature of expertise have focused on how experts across different fields demonstrate similarities in their behaviors (Bloom, 1985; Cooke, 1992; de Groot, 1978; Ericsson & Crutcher, 1990, Ericsson & Charness 1994; Ericsson, Krampe, & Tesch-Römer, 1993; Hayes, 1981; Patel & Groen, 1988). In the 1970s, researchers such as Chase and Simon (1973) believed experts in a single field established basic skills that would allow them to quickly master other fields. Many of these studies relied on the work of de Groot (1946, 1978) and his seminal study on expert chess players, showing that expert chess players were better able than novices to remember patterns of chess sequences. One's knowledge of the domain was secondary to the knowledge of the heuristic. As many have noted (e.g., Ericsson & Charness, 1994; Rosenbloom & Newell, 1986), these arguments were short lived, but they were the foundation of the psychology of expertise.

Pattern Heuristics

As more theorists rejected the plausibility of any single heuristic to provide expertise in multiple fields, researchers turned to subdisciplines. Theories argued that expert chess players created specialized heuristics to assist them in their field of study. The skills used in chess were different that the skills required to master, say, physics, but the heuristics for mastering chess were identifiable. Experts were viewed as people who had mastered advanced methods of solving problems within a specific domain (Schneider, Gruber, Gold, & Opwis, 1993). They grasped more information through perceiving patterns, rather than focusing on the individual facets of the

problem. This decreased the time required to reach a solution and produced more accurate solutions (Cooke, 1992; Dreyfus & Dreyfus, 1986). The specialized heuristics also assist the expert in conceptualizing the problem structure (Popal, 1982). Rather than organize knowledge based on superficial and often irrelevant as novices did (Etringer, Hillerbrand, & Claiborn, 1995).

The development of pattern heuristics corresponds with a shift in the problem solver's methodology. As they gain expertise and begin to predict facets within routine problems, problem solvers learn to work forward from the facts to a desired outcome (Hunt, 1989). They work from a given pattern of information toward an expected conclusion. Novices work backward from a specific goal or a theoretical conceptualization of the client to the facts (Patel & Groen, 1991). They formulate tentative solutions and seek confirmatory or disconfirmatory evidence for the solution. Patel and Groen (1986) found that all of their medical subjects who made completely accurate diagnoses used "pure" forward reasoning, but that none of the subjects who made inaccurate diagnoses utilized this technique.

Breaking the Rules.

What happens when a pattern does not appear to develop or when the developing pattern is unfamiliar? Goldin (1978) noted that although experts in chess are able to recognize familiar positions and patterns quickly, they are considerably less efficient in recognizing atypical patterns. Patel and Groen (1991) found that expert medical clinicians faired better than novices only when working on a normally-structured problem. When the structure of the problem was changed, novices continued their strategy of reasoning without significant change in their level of

performance. The performance of the more experienced physicians, on the other hand, deteriorated to the level of the novices' performance.

The same changes were noted by Hillerbrand and Claiborn (1990) concerning psychological judgment and diagnosis. When diagnostic patterns became less consistent with realistic diagnostic patterns, the participants' cognitive processes became less efficient. This finding was especially noteworthy for experts, who made rapid and brad inferences, suitable predictions but engaged in less hypothesis testing than novices when examining a well-structured problem. Decreased structure appears to affect the experts' ability to automate their reasoning processes.

Literature on Psychological Expertise

Little research exists concerning the process of making a psychological diagnosis (Hillerbrand & Claiborn, 1990). It is likely that some of the same skills found in expert psychotherapists, such as active listening (Vargo & McFarlane, 1994) and attending to client statements (Hayes & Wolf, 1984) and nonverbal behavior (Clinard, 1985), would also exist for expert diagnosticians. However, there is no literature examining such hypotheses.

As Goodyear (in press) notes, experience is often used as a proxy for expertise. Ericsson and Lehmann's (1996) argument that 10 years are required for the development of expertise in any field continues to champion the correlation of experience with expertise. The therapist, however, must be deliberately attempting to develop skills for experience to have the desired effect on expertise (Clark, 1992; Ericsson et al , 1993).

Dawes' (1989, 1994) contention that practice and experience alone appear insufficient to produce expertise in psychological inquiry is well supported. Garb's (1989) review of the literature is a good example. One possible way of overcoming the limitations of effectiveness would be to engage in specialized, deliberate practice and maintain a broad, cognitively complex perspective on encountered problems. For example, the literature on rape victims suggests that these individuals had a higher than average rate of prior sexual abuse and a higher than average rate of attempted suicides (Ben & Silfen, 1993). Women who were molested, raped, or experienced attempted rape were also more likely than average to tax their capacity for handling depression and anxiety (Kilpatrick, 1985). Because experience lends itself to predicting commonly encountered patterns, expert therapists who had encountered rape victims would be more likely to identify issues of suicidal ideation, anxiety, and depression. The connection between specialized experience and effective judgments has not been adequately addressed in the literature, though it has been discussed (Beutler, 1989).

Level of Academic Training

Little research exists on the processes psychologists go through when making their assessment or diagnosis (Gelso & Fretz, 1992) or on the role of academic training on the assessment process. Early studies in assessment focused on the relationship between diagnosis and the adherence to a single theoretical perspective (McArthur, 1954; Koester, 1954). The argument was made that theoretical orientations should be rigidly adhered to for effective diagnoses. More recently, Lanyon and Goodstein's (1982) review found that effective diagnosticians were more likely to seek client feedback concerning the accuracy of the proposed diagnosis. However, these

are preliminary studies, and they do not address the relationship between the assessment process and academic training.

Most research on the relationship between training and the diagnostic process focused on the ability of experts to form accurate diagnoses (e.g., Christensen & Jacobsen, 1994; Dawes, 1994; and Goldberg, 1959, 1968; Hattie, Sharpley, & Rogers, 1984; and Stein & Lambert 1989, 1995). This contention has received support through Smith and Glass' meta-analysis on the effectiveness of psychotherapy which found that credentials (e.g., Ph.D., M.D., no advanced degree, etc.) made no statistically significant impact. At best, the current body of literature supports the contention that professionals have roughly the same client outcomes as paraprofessionals (Berman & Norton, 1985).

The inability of trained psychologists to out perform minimally trained non-psychologists in diagnosis and treatment also appears to extend to non-diagnostic judgments. Interviews, the primary source of therapeutic information, are now considered unreliable (Dawes, 1994; Gelso, 1992). However, it is possible that academic training has an impact on the types of inquiries made in ways that are not directly related to diagnostic accuracy. For example, it has long been argued that gathering a life history is an important assessment task (Gelso, 1992). Do therapists with doctoral degrees emphasize these issues more the psychologists in training? Does training encourage psychologists to ask the same types of questions, or does it encourage them to creatively explore individualistic approaches?

O'Byrne's (1993) study provided an initial investigation into these processes. She found that expert psychologists tended to request significantly more client information, asked fewer

crisis-related questions, and asked more questions on a given topic. However, some of these findings, such as the tendency to ask more questions, contradict what would be expected from the general literature one expertise. Further investigations are warranted.

Literature on Threats to Psychological Expertise

A significant difficulty with diagnostic criteria involves the ability of therapists to develop accurate and reliable assessments of client problems. Despite the apparent weaknesses of training and experience to produce reliable diagnosticians, therapists report high levels of confidence in their judgments. Vallone, Griffin, Lin, and Ross (1990) reported that therapists' levels of confidence are inversely correlated with accuracy (see also Arnold, 1993). As psychologists become less accurate, they evoke high manifest levels of confidence (Hillerbrand & Claiborn, 1990). There is a long history of literature indicating that therapists will report higher levels of confidence than they merit (Dumont, 1993; Dunning, Griffin, Milojkovic, & Ross, 1990; Glidewell & Livert, 1992; and Tracy, 1991).

Despite their problem with overconfidence, experienced therapists are better at describing which of their judgments are more likely to be accurate (Garb, 1986, 1989). Others have noted that confidence changes with information. Oskamp (1982) found that clinicians confidence in their judgments grow with additional knowledge of the client, and Hillerbrand and Claiborn (1990) noted that experts felt more knowledgeable and confident in their judgments even though their cognitive processing did not statistically differ from those of novices.

One reason for the presence of overconfidence is the tendency for experts to automate their procedures. Less information is required to make these judgments because patterns are

quickly identified (Dumont, 1991). However, when experts confront variants to typically encountered problems, the investigative process may be arrested prematurely. These are the cases where experts do not appear to perform better than novices (Patel & Groen, 1991).

In this study four research questions were addressed:

Question 1. As clinical experience increases, do psychologists use forward reasoning to change their mode of inquiry?

Question 2. Does level of academic training affect the amount and type of information psychologists seek?

Question 3. As psychologists gain experience, does their level of confidence rise?

Question 4. As experience increases, do psychologists take less time to formulate or analyze their questions?

Method

Participants

Participants were 138 (86 men, 52 women) psychologists or psychology students. Most (n = 68, 49%) had a doctorate in psychology or had been advanced to candidacy in a doctoral program (n = 14, 10%). The rest (n = 56, 41%) ranged from those who were just beginning graduate training to doctoral candidates.

Most (n = 106, 77%) participants were White. The rest described themselves as Asian (n = 6, 4%), Black (n = 4, 3%), Latino (n = 2, 1%), or "other" (n = 20, 15%). Participants' experience ranged from 0 to 31 years (M = 6.03, SD = 7.19). The largest group (n = 50, 36%) described themselves as academic faculty. The rest were clinicians at Veteran's Administration hospitals (n = 18, 13%), community mental health center (n = 19, 14%), university counseling centers (n = 21, 15%). some (n = 30, 22%) were not presently employed.

Materials

An interactive, artificially intelligent, computer program, modeled after O'Byrne's (1993) study, was written for this study. The program approximates a real-life assessment situation and simulates a client's responses to questions. The "client's" presenting problem involved a recent date rape experience. Participants were informed that she had been referred by a colleague who diagnosed her with PTSD.

Participants could ask any question they wished within the confines of 65 typed characters. The computerized client had information on the etiology of several psychological problems, psychosocial history, developmental history, family background, and facts about the crisis. As the participant asked questions of the computerized client, it responded and waited for the participant to hit a keyboard key to continue. For example, the participant could ask, "I know this is difficult, but tell me what happened the night of the rape." To this the computer would respond with the statement:

> Mark and I went out three times. Once to the movies, once to dinner, and finally on a camping trip with his friends. We shared a tent, and I told him I didn't want to make love with him, but he hit me and tore off my panties. He must have sensed that I was attracted to him. It's my fault.

The computer program kept track of demographic information, participants' self-ratings of accuracy, participants' self-ratings of expertise, and a variety of variables involving the participant's mode of inquiry.

The program contained 203 pre-set, paragraph answers that were created using responses from 22 participants during pilot testing. When these pilot participants asked questions the program could not answer, a new answer was created and feedback was sought as to perceived appropriateness of new client response. Also when the program inaccurately answered a question that was posed by one of these participants, the database was manually searched for the correct answer, then the program was changed to handle the participant's linguistic style for future use.

Potential answers were coded along a 3-point continuum: 0 points meant the answer contained general information, 1 point meant the answer was a general mental-health answer, and 2 points meant the answer specifically involved the crisis at hand. These variables were coded by three, female, psychology interns who obtained an inter-rater reliability of .76 using Cronbach's alpha.

Dependent Measures

The self-ratings of accuracy and expertise were obtained after participants finished asking questions of "the client." Each of these two ratings was a single-item that employed a 7-point, Likert-type scale (where 1 = very low and 7 = very high). The time taken to read the case (Time-to-Read-Case), ask a question (Time-for-Average-Question), and formulate a treatment plan (Time-for-Writing-Plan) were also calculated.

The primary variables for the study were comprised of methods of categorizing the type and number of questions asked. These variables included: (a) the total number of questions asked (Total-Number-of-Questions), (b) the number of questions the computer program could not recognize (Unique-Questions), (c) the number of questions asked that were extensions of

previously asked questions (Follow-up-Questions), (d) the number of questions exploring material specifically connected to the case (Case-Related-Questions), (e) the number of questions regarding the client's personal history (Client-History-Questions), the (f) number of questions exploring diagnostic criteria (Diagnostic-Questions), (h) the range of questions, (i) the number of questions the participant asked that were prompted by the client, (j) the number of questions asked involving suicidal ideation (Suicide-Questions), (k) homicidal ideation (Homicide-Questions), (l) drug or alcohol use (Alcohol-Questions), or (m) a combination of these items (Critical-Items).

Procedures

Participants were recruited through a variety of means from 139 sites in 24 states and six countries (Australia, Belgium, Canada, Netherlands, Norway, and the United States). First, 12 internet postings for volunteers elicited 40 participants. Second, the Veterans Administration Hospitals in Loma Linda California and Anchorage Alaska provided 18 participants, including 2 students, 3 interns, and 15 licensed psychologists. Third, a random selection of practicing psychologists from California was conducted using the Internet White pages (which lists the phone numbers of all known psychologists within a given area). The fourth and final group of participants (n = 60) came from randomly selected training centers in the Southern California area.

Participants were randomly assigned by computer to one of three treatment groups: (a) clinical impression, (b) DSM diagnosis, or (c) treatment plan. The assignment to groups was performed with each new participant rather than by diskette. For example, if three people chose to

participate, they would each be randomly assigned to a group even though they used the same diskette to run the program. Once assigned to a group, the program would modify all the various instruction pages to reflect the assigned group.

A total of 90 diskettes were returned. Some diskettes, though, contained data from multiple participants, which yielded the data for 138 participants.

Results

Descriptive Data Results

The 25 main variables for this study varied from dichotomous variables to large, continuous time variables.

Reliabilities were calculated for all main effect variables, excluding the time-related variables. These results are displayed in Table 1.

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insert Table 1 about here

Two simultaneous, multiple-regression analyses were performed to examine the research questions involving years of experience. A Hotellings MANOVA and Discriminant Function Analysis with Scheffé post hoc was employed to examine the effects of training.

Experience and Types of Questions Asked

Experienced explained approximately 32% ($R^2 = .32$, $F(5,132) = 12.69$, $p < .0001$) of the variance for the types of questions asked. After employing a Bonferroni correction, four of the

five variables were significant related to experience. As psychologists gained experience, they were more likely to

(a) attend to the client details (such as re-reading the case, asking questions prompted by the client, and asking questions directly related to the case description), $F(5,135) = 2.60$, $p = .010$

(b) de-emphasize information gathering at either the beginning and end of the questioning, $F(8,35)=2.66$, $p = .009$

(c) ask fewer questions, $F(8,35) = -3.16$, $p = .002$, and

(d) ask more diagnostic related questions, $F(8,35) = 6.12$, $p < .0001$,

Experience did not differentiate participants in the tendency to ask more unique or unpredictable questions, $F(3,135) = 1.02$, $p = .308$.

Academic training and mode of inquiry

Participants' level of academic training was divided into four categories including new students to psychology ($n = 36$), masters level therapists ($n = 20$), doctoral level students ($n = 14$), and doctoral level therapists ($n = 68$). A significant main effect of training was obtained, $F(3,132) = 5.19$, $p < .001$using the Pillai's Trace criterion. A total of 9 the 11 dependent variables achieved significance.

A discriminant function analysis (DFA) was performed to assess the predictability of the significant differences created by level of training. The significant discriminant functions indicate that the variables entered into discriminant analysis identified differences between groups beyond what would be predicted by chance. The classification results, found in, Table 2 indicate that there

was a 69.12% correct prediction of group membership based on the predictor variables entered into the simultaneous discriminant analysis. The group representing students beginning their academic training was correctly predicted 73.7% of the time. The group of masters level therapists was correctly predicted 62.5% of the time. The group of doctoral level students was correctly predicted 64.3% of the time. The final group, doctoral therapists, was correctly predicted 69.1% of the time.

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insert Table 2 about here

Another interesting finding was the increase in prediction value once participants were grouped according to their assigned goal. Three additional DFAs were conducted to examine the effect of training on the types of questions asked when asked to perform specific tasks. Participants who were told they were asking questions in order to form a clinical impression were accurately predicted by level of training 91.67% of the time. The group told they were asking questions in order to form a DSM-IV diagnosis were accurately predicted by level of training 86.67% of the time. The final, group, who were told to form a treatment plan, were accurately predicted by level of training 82.50% of the time.

Experience and Levels of Confidence

Perceived expertise with date-rape clients and perceived confidence in judgment were significantly correlated ($r = .532$, $p < .01$), but neither variable was significantly correlated with experience.

Efficiency of Experienced Clinicians

A simultaneous multiple regression was performed on experience as the independent variable and five dependent variables (Time-for-Writing-Plan, Time-to-Read-Case, and Time-for-Average-Question). The results were nonsignificant ($R^2 = .12$, $F(2,135) = .92$, $p = .400$). Experience did not appear to be related to efficiency of inquiry, at least as it was operationalized by these variables.

Discussion

This study used a artificially intelligent computer program to explore how psychologists gather information about their clients. Evidence was found for the following:

- The types of questions psychologists ask are largely explained by experience.
- The methods psychologists use to explore client data can predict their level of academic training.
- Experience is unrelated to case-specific, self-rated confidence or expertise
- Experienced psychologists are not more efficient in gathering information than their less experienced colleagues.

Supported Research Themes

Etringer, Hillerbrand, and Claiborn (1995) reviewed the literature on expertise and concluded that experts use procedural knowledge, forward reasoning, and move toward automation. These studies frequently emphasized the cognitive process experts engaged in without examining the behaviors that followed. This study's use of a mock clinical setting sheds additional light on the process of expertise by looking at the tasks on which experienced therapists choose to act.

Experience and Information Gathering

As psychologists gain experience, they being to ask questions differently. This corresponds to O'Byrne and Goodyear's (1993) findings that experts in psychology tended to have a "common clinical wisdom." However, the "wisdom" of the therapists in this study, took a

somewhat different form than the wisdom depicted by O'Byrne and Good year (1993). They found that experts tended to ask questions similar to those of other experts, while beginning therapists asked more unique questions. Experts were also more likely to ask questions about the client's history, and they asked more questions overall. In this analysis, the "common wisdom" was identified for inquiries into diagnostic criteria, but most of the positions found by O'Byrne and Goodyear were not supported in the Multiple Regression analysis.

In this study, as the psychologists gained experience, they were not more likely to ask unique or unpredictable questions. Also in contrast to the O'Byrne (1993) study, experienced psychologists were not more likely to explore their client's history or ask more questions ($F(8,35) = -3.16$, $p = .002$). Experience was negatively related to the number of questions asked, which supports the general theory that experience leads to a form of automation (Anderson, 1981; Dumont, 1991; Glaser, 1991).

The "common clinical wisdom" supported by this study involved that was associated with increased experience involved a number was the tendency to attend to client details (as evidenced by re-reading the case, asking questions prompted by the client, and asking questions directly related to the case description, etc.), $F(5,135) = 2.60$, $p = .010$. Experience also assisted in a general de-emphasis of information gathering (e.g., client history) and an emphasis on crisis intervention, $F(8,35) = 2.66$, $p = .009$. This tendency to favor intervention compares well with the tendency to explore diagnostic related questions, $F(8,35) = 6.12$, $p < .0001$. However, experienced participants explored these issues by asking fewer questions, $F(8,35) = -3.16$, $p < .002$.

It appears that experience helped therapists to "listen" to the client better. Nevertheless, experienced therapists had an agenda. Most of their crisis intervention questions came from seeking diagnostic information, such as "do you feel sad more days than not?" If asked, the fictitious client presented with symptoms of depression and anxiety. This fits the Dreyfus and Dreyfus (1986) model of developmental expertise. Experts depend more upon the immediate context of the problem than its origin. The uniqueness of the client involves how the present symptoms develop out of the client's personal history. This may underlie the reasons why experience does not appear to play a role in asking history questions. Beginners may ask the same number of history and information questions as expects but they did not explore them in the context of the current symptomology. Experts appear to ask history questions to fill in the gaps created through their intervention questions.

Experienced therapists primarily fill in the gaps of a developing theory of the client, which may explain the negative correlation between experience and the number of questions asked ($t(132) = -3.651$, $p = .0004$). As Polkinghorne (1992) argued, experts appear to use prototypes in their conceptualization of clients. They use forward reasoning to seek confirmatory or disconfirmatory of their developing hypothesis.

One reason why the O'Byrne (1993) study may have concluded that experience led to therapists asking additional questions was categorization of participants as experts. In this study, experienced was correlated with asking fewer questions but increased training was correlated with more questions. Another reason for the difference was O'Byrne's method of analyzing the data.

When dividing participants into beginners, intermediates, and experts and analyzed with a MANOVA, the results dramatically differed from the multiple regression.

Although the MANOVA analysis was significant ($F(2,135) = 5.071$, $p < .0001$), it suggested that experience was significantly, positively correlated with the number of questions asked ($F(2,135) = 3.135$, $p = .046$), and significantly, positively correlated with inquiries made into the client's alcohol consumption ($t(2,135) = 15.35$, $p < .0001$). In the multiple regression analysis both variables were negatively correlated with experience ($t(14,123) = -3.335$, $p = .001$, and ($t(14,123) = -2.783$, $p = .0062$).

Though the reasons for the differences are not yet clear, the multiple regression analysis is believed to be a more appropriate statistical procedure in these cases, because of the data lost when converting continuous variables to categorical variables. Light, Singer, and Willett (1990, p. 83) argue "on no account should perfectly good continuous predictors like these be artificially reduced to a small number of discrete categories."

Academic Training

Level of academic training also had a significant effect ($F(3,132) = 5.19$, $p < .001$) on clinicians' modes of inquiry. As levels of academic training increased, so did experience ($r = .646$, $p < .01$), but training still has a significant effect even when a MANCOVA was employed to control for the effects of experience ($F(1,131) = 1.91$, $p = .044$). There is no apparent problem with multicollinearity (Tabachnick & Fidell, 1983). Experience and training measure different constructs.

Higher levels of training were unrelated 8 of the 11 variables explored. Two of the three significant variables contradicted the findings for experienced participants (total number of questions ($F(2,135) = 4.02$, $p = .020$) and client history questions ($F(2,135) = 5.89$, $p = .004$). The only variable corresponding to findings for increased experience was the tendency to follow up on previously asked questions ($F(2,135) = 6.38$, $p = .002$).

The post hoc analysis did not reveal any significant differences between doctoral students and psychologists with doctoral degrees, but the predictability of each group within the functions of group centroids was highly significant. Participants were correctly classified into their corresponding groups over 69% of the time, and even more accurately when participants were divided into specific tasks.

This ability to predict participants' level of training did not follow a linear progression. There were two functions found in the discriminant functioning analysis. Both functions played key roles in discerning between experts and novices. The variables loading on function 1 were Diagnostic-Questions, Follow-up-Questions, Critical-Issue-Questions, Preference for Intervention over Information, and Total Number of Questions. All of these variables involve either the process of investigating specific client symptoms or maintaining a broad approach to the issues explored. This function will be referred to as diagnostic inquiry.

Function 2 consisted of Case-Related-Questions, History-Questions, and Unique-Questions. These variables involve the process of attending to client cues or exploring non-diagnostic, client issues. This factor will be referred to as detail inquiry.

An apparent curvilinear relationship exists between the academic training and the two functions. Participants in the least trained group scored lower in diagnostic inquiry any other group, and lower than the masters and early doctoral groups in detail inquiry. The next two training groups, predictably, scored higher on both functions. The surprising component was the performance of the doctoral-level psychologists. They scored lower than all other groups on the detail inquiry category, but scored higher than all other groups on the diagnostic inquiry function. Rather than follow the client's prompts or emphasize history issues, the psychologists focused on the problems at hand such as suicide, depression, and alcohol. This finding corresponds to Patel and Groen's (1991) study concerning intermediate or mid-term students. In their study, intermediates recalled more irrelevant and more relevant information than did experts. Similarly, in this study, the group with the most training appears to have underemphasized issues brought out by the client in order to favor the most significant areas of inquiry.

The tendency for the accuracy of prediction to dramatically increase when participants were examined by randomly assigned treatment groups, also corresponds to the literature on expertise and automation. It provides the increase structure that Hillerbrand and Claiborn (1990) found essential in the process of automation.

Self-Rated Confidence

There is a long history of literature indicating that therapists will report higher levels of confidence than they merit (Dumont, 1993; Dunning, Griffin, Milojkovic, & Ross, 1990; Glidewell & Livert, 1992; and Tracy, 1991). However, according to the literature, psychologists tend to become more confident with experience (Arnold, 1993).

In this study, neither self-rated confidence or self-rated expertise were significantly correlated with any of the main variables. Confidence did not increase with experience, nor did it positively or negatively affect the participants' investigation.

Efficient Therapists

The literature on expertise in most examined fields strongly supports a connection between efficiency and experience (e.g., Koupernik, 1995). Once certain procedures become automated, it is reasonable to assume that they would take less time to formulate their mode of inquiry. In this study, no such connection was found.

O'Byrne (1993) found a significant difference between the time spent by experts and novices in asking questions (M = 8.71 minutes for novices, M = 10.00 minutes for experts). In this study, the average time spent asking questions was considerably longer (M = 29.30 minutes for all participants with a standard deviation of 16.47 minutes). Participants ranged in the time spent asking questions from a low of 11 minutes to a high of 117 minutes. The computer probably contributed to the time increase. There was no human interaction during the data collection, which provided participants with more perceived autonomy. Nevertheless, the multiple regression analysis found no significant effect for experience on the time spent asking questions ($F(5,132)$ = .726, p = .604). Experience also had no statistical impact on the time spent formulating diagnosis

questions, but it did assist in reducing the time spent formulating questions about the client's history ($r = -.160$, $p < .001$).

The general lack of efficiency may be explained by the complexity of the task at hand. For example, expert writers do not automatically applying in their discipline. The art involves a constant interaction between knowledge, experience, and the task at hand. This often makes writing more difficult for experts than for novices; it becomes a more complex process. Novice writers simply write out their thoughts, but expert writers plan, revise, and mine their knowledge base for the best possible method of communicating a thought (Flower, 1979).

Summary and Conclusions

This paper is significant in that it provides evidence of the effects training and experience have on the types of information psychologists may ask of their clients. In also provides a window into the ways psychologists might automate their modes of inquiry and conceptualize cases.

The results for this study, however, should be viewed with some caution for several reasons. First, the moderate sample size was not large enough to overcome the differences between the participant pools. The various samples differed on several keys areas. Three of the four groups were selected randomly from specific settings, but the fourth group was comprised of volunteers. This highly trained, computer literate group may have effected the variance of the main variables.

Second, the medium of the computer may have changed the ways the participating psychologists may have handled the case presentation. Part of this study investigated the way

atypical problems changed psychologists' modes of inquiry. The moderating effect of the computer may have made the entire process "atypical." Even if the types of questions asked were similar to those the participants would have asked a client, it is likely that the time spent asking questions differed in this study. Participants may have enjoyed the process of taking as much time as they wished without being prompted to continue. This freedom likely impacted the therapists' inquiries.

The automated client responses and lack of sensory input also may have changed the questions that were asked. Although the computer program was very successful in answering questions, true dialogue was not possible. The therapists were also unable to react to client cues. The inability for the computer to produce tones, gestures, pauses, or other nonverbal cues may have changed the therapists' mode of inquiry.

Third, there is no way of knowing if participants would have reacted differently if the case were about a male client. Gender effects should be explored in future studies. Nevertheless, the results of this analysis provide an important first step to understanding the ways experience, academic training, cognitive complexity, and assessment task change psychologists' modes of inquiry.

Despite these weaknesses, the study appears valid and provides increased depth and perspective to the O'Byrne (1993) study. The weaknesses discussed here do not appear significant enough to overcome the strong effective sizes found in this study.

It should be noted that the findings here suggest that experience and training play a significant role in the investigative process psychologists employ when assessing a client. This

study cannot posit, however, the superiority of one method over another. It is possible that the methods used by beginning psychologists are functionally equivalent to that that of advanced psychologists. Further studies should explore the relationship of the assessment methods outlined in this study with diagnostic accuracy or increased therapeutic outcomes. Previous studies comparing beginning and advanced psychologists found little differences between the diagnostic outcomes of the two groups. Now that an effective tool exists to predict expert vs. novice group membership based on the mode of inquiry used, there is reason to believe that the two groups should arrive at different conclusions.

References

Anderson, J. R. (1981). Cognitive skills and their acquisition. Hillside, NJ: Erlbaum.

Arnold, R. C. (1993). Effects of experience, attitude, and response cost on clinician diagnostic sensitivity, response bias, and confidence. (Doctoral dissertation, Brigham Young University, 1990). Dissertation Abstracts International, 54(2-B), 1086.

Ben, D. S., & Silfen, P. (1993). Rape death and resurrection: Male reaction after disclosure of the secret of being a rape victim. Medicine & Law, 12, 181-189.

Berman, J. S., & Norton, N. C. (1985). Does professional training make a therapist more effective? Psychological Bulletin, 98, 401-407.

Beutler, L. E. (1989). The misplaced role of theory in psychotherapy integration. Journal of Integrative and Eclectic Psychotherapy, 8, 17-22.

Bloom, B. S. (Ed.). (1985). Developing talent in young people. New York: Ballantine Books.

Clark, R. E. (1992). Human performance interventions for Irish organizations. The Irish Journal of Psychology, 13(1), 1-16.

Clinard, H. (1985). Listen for the difference. Training & Development Journal, 39(10), 39.

Cooke, N. J. (1992). Modeling human expertise in expert systems. In R. R. Hoffman (Ed.), The psychology of expertise: Cognitive research and empirical AI (pp. 29-60). New York: Springer-Verlag.

Dawes, R. M. (1986). Representative thinking in clinical judgment. Clinical Psychology Review, 6, 425-441.

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Dawes, R. M. (1989). Experience and validity of clinical judgment: The illusory correlation. Behavioral Sciences & the Law, 7, 457-467.

Dawes, R. M. (1994). House of cards: Psychology and psychotherapy built on myth. New York: The Free Press.

de Groot, A. (1978). Thought and choice in chess. The Hague, Netherlands: Mouton. (Original work published 1946).

Dreyfus, H. L., & Dreyfus, S. E. (1986). Mind over machine: The power of human intuition and expertise in the era of the computer. New York: The Free Press.

Dumont, F. (1991). Expertise in psychotherapy: Inherent liabilities of becoming experienced. Psychotherapy, 28, 422-428.

Dumont, F. (1993). Inferential heuristics in clinical problem formulation: Selective review of their strengths and weaknesses. Professional Psychology: Research and Practice, 24, 196-205.

Dunning, D., Griffin, D. W., Milojkovic, J. D., & Ross, L. (1990). The overconfidence effect in social Rationale. Journal of Personality and Social Psychology, 58, 568-581.

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. American Psychologist, 48, 725-747.

Ericsson, K. A., & Crutcher, R. J. (1990). The nature of exceptional performance. In P. B. Baltes, D. L. Featherman, & R. M. Learner (Eds.), Life-span development and behavior (Vol. 10, pp. 187-217). Hillsdale, NJ: Erlbaum.

Ericsson, K. A., & Smith, J. (1991). Prospect and limits of the empirical study of expertise: An introduction. In K. A. Ericsson, & J. Smith (Eds.), Toward a general theory of expertise: Prospect and limits (pp. 1-38). Cambridge: Cambridge University Press.

Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. Psychological Review, 100, 363-406.

Etringer, B. D., Hillerbrand, E., Claiborn, C. D. (1995). The transition from novice to expert counselor. Counselor Education and Supervision, 35, 4-17.

Flower, L. S. (1979). Writer-based prose: A cognitive basis for problems in writing. College English, 41, 19-37.

Garb, H. N. (1986). The appropriateness of confidence ratings in clinical judgment. Journal of Clinical Psychology, 42, 190-197.

Garb, H. N. (1989). Clinical judgment, clinical training, and professional experience. Psychological Bulletin, 105, 387-396.

Garmer, K., Dahlman, S., & Sperling, L. (1995). Ergonomic development work: Co-education as a support for user participation at a car assembly plant: A case study. Applied Ergonomics, 26, 417-423.

Gelso, C. J., & Fretz, B. R. (1992). Counseling Psychology. Fort Worth: Harcourt Brace Jovanovich College Publishers.

Glidewell, J. C., & Livert, D. E. (1992). Confidence in the practice of clinical psychology. Professional Psychology: Research and Practice, 25, 362-368.

Goldberg, L. R. (1959). The effectiveness of clinicians' judgments: The diagnosis of organic brain damage from the Bender-Gestalt test. Journal of Consulting Psychology, 23, 25-33.

Goldberg, L. R. (1968). Simple or simple processes: Some research on clinical judgments. American Psychologist, 23, 483-496.

Goldin, S. E. (1978). Memory for the ordinary: Typicality effects in chess positions. Journal of Experimental Psychology: Human Learning and Memory, 4, 605-616.

Goodyear, R. K. (in press). Psychological expertise and the role of individual differences: An exploration of issues. Educational Psychology Review.

Hattie, J. A., Sharpley, C. F., & Rogers, H. J. (1984). Comparative effectiveness of professional and paraprofessional helpers. Psychological Bulletin, 92, 534-541.

Hayes, J. R. (1981). The complete problem solver. Philadelphia: Franklin Institute Press.

Hayes, S. C., & Wolf, M. R. (1984). Cues, consequences and therapeutic talk: Effects of social context and coping statements on pain. Behavior Research & Therapy, 22, 385-392.

Hillerbrand, E. (1989). Cognitive differences between experts and novices: Implications for group supervision. Journal of Counseling and Development, 67, 293-296.

Hunt, E. (1989). Cognitive science: Definition, status, and questions. Annual Review of Psychology, 40, 603-629.

Kilpatrick, D. G. (1985). Mental health correlates of criminal victimization: A random community survey. Journal of Consulting and Clinical Psychology, 53, 866-873.

Koester, G. A. (1954). A study of the diagnostic process. Educational Psychological Measurement, 14, 473-486.

Koupernik, C. (1995). Psychiatric clinics and medical clinics. Annales Medico-Psychologiques, 153, 212-216.

Light, R. J., Singer, J. D., & Willett, J. B. (1990). By design: Planning research on higher education. Cambridge, MA: Harvard University Press.

McArthur, C. (1954). Analyzing the clinical process. Journal of Counseling Psychology 1, 203-208.

McGill, A. R., Johnson, M. D., & Bantel, K. A. (1994). Cognitive complexity and conformity: Effects on performance in a turbulent environment. Psychological Reports, 73, 1451-1472.

Mitchell, R. K., & Chesteen, S. A. (1995). Enhancing entrepreneurial expertise: Experiential pedagogy and the new venture expert script. Simulation & Gaming, 26, 288-306.

O'Byrne, K. (1993). The relationship between psychological expertise and clinical assessment: A comparison of novice and expert performance. (Unpublished doctoral dissertation, University of Southern California).

O'Byrne, K. R., & Goodyear, R. K. (1993). Expert and novice psychologists' client assessment: A comparison of strategies. Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.

Oskamp, S. (1982). Overconfidence in case-study judgments. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), Judgment under uncertainty: Heuristics and biases (pp. 287-293). New York: Cambridge University Press.

Pain, M. D., & Sharpley, C. F. (1989). Varying the order in which positive and negative information is presented: Effects on counselors' judgments of clients' mental health. Journal of Counseling Psychology, 36, 3-7.

Patel, V. L., & Groen, G. J. (1986). Knowledge-based solutions in medical reasoning. Cognitive Science, 10, 91-116.

Patel, V. L., & Groen, G. J. (1988). Biomedical knowledge in clinical reasoning. In D. Evans, & V. Patel (Eds.), Cognitive science in medicine: Biomedical modeling (pp. 207-251). Cambridge, MA: MIT Press.

Patel, V. L., & Groen, G.J. (1991). The nature of medical expertise: A critical look. In K. A. Ericsson, & J. Smith (Eds.), Toward a general theory of expertise: Prospect and limits (pp. 93-125). Cambridge: Cambridge University Press.

Polkinghorne, D. E. (1992). Postmodern epistemology of practice. In S. Kvale (Ed.), Psychology and postmodernism (pp. 146-165). London: Sage.

Popal, H. E. (1982). Heuristic methods for imposing structure on ill-structured problems: The structuring of medical diagnostics. In P. Szolovits (Ed.) Artificial intelligence in medicine (pp. 100-121.) Boulder, CO: Westview Press.

Pugach, M. C., & Johnson, L. J. (1995). Unlocking expertise among classroom teachers through structured dialogue: Extending research on peer collaboration. Exceptional Children, 62, 101-110.

Radhakrishnan, P., Arrow, H., & Sniezek, J. (1996). Hoping, performing, learning, and predicting: Changes in the accuracy of self-evaluations of performance. Human Performance, 9, 23-49.

Rosenbloom, P. S., & Newell, A. (1986). The chunking of goal hierarchies: A generalized model of practice. In R. S. Michalski, J. G. Carbonell, & T. M. Mitchell (Eds.), Machine learning: An artificial intelligence approach (Vol. 2, pp. 247-288). Los Altos, CA: Morgan Kaufmann.

Stein, D. M., & Lambert, M. J. (1995). Graduate training in psychotherapy: Are therapy outcomes enhanced? Journal of Consulting and Clinical Psychology, 63, 182-196.

Tabachnick, B. G., & Fidell, L. S. (1983). Using multivariate statistics. New York: Harper and Row.

Vallone, R. P., Griffin, D. W., Lin, S., & Ross, L. (1990). Overconfident predication of future actions and outcomes by self and others. Journal of Personality and Social Psychology, 52, 582-592.

Vargo, J. W., & McFarlane, L. H. (1994). Why didn't I say that? Techniques for counseling clients and their families. Journal of Speech-Language Pathology & Audiology, 18, 157-162.

Table 1

Reliability of Main Effect, Excluding Time Variables (N = 138)

	Scale Mean if Deleted	Scale Variance if Deleted	Corrected Item Total Correlation	Alpha if Item Deleted
Suicide-Questions	54.391	1089.358	.648	.616
Homicide-Questions	55.362	1148.760	.334	.637
Alcohol-Questions	54.862	1119.307	.561	.627
Range-of-Questions	51.348	1086.237	.745	.614
Total-Number-of-Questions	31.435	249.045	.828	.783
Unique-Questions	55.289	1165.550	.062	.643
Client-Cues	54.623	1114.262	.442	.626
Follow-up-Questions	50.790	905.630	.878	.546
Case-Related-Questions	54.580	1105.509	.699	.622
Mode-for-Average-Question	54.913	1154.030	.401	.639
Mode-for-Early-Questions	54.855	1153.531	.267	.639
Mode-for-Late-Questions	54.725	1169.709	-.083	.645
Self-Rated-Confidence	51.478	1173.355	-.085	.648
Self-Rated-Expertise	52.681	1165.601	-.019	.646
Number-of-Case-Readings	53.942	1158.919	.080	.642
Client-History Questions	51.449	924.257	.794	.557
Diagnostic-Questions	53.710	1073.249	.630	.611

Table 2

Summary of Simultaneous Regression Analysis for Variables Predicting Effects of Academic Training on Mode of Inquiry (N = 136)

	Actual Group	Number of Cases	Predicted Group Membership 1	2	3	4
Group	1	38	38	5	4	1
New			73.7*	13.2%	10.5%	12.5
Group	2	16	2	10	2	2
Masters therapists			12.5%	62.5%*	12.5%	12.5%
Group	3	14	0	3	9	2
Doctoral students			0%	21.4%	64.3%*	14.3%
Group	4	68	9	8	4	47
Doctoral therapists			13.2%	11.8%	5.9%	61.9%*

Percent of "grouped" cases correctly classified: 69.12%

* indicates significance greater than chance, with chance being equal to 25%